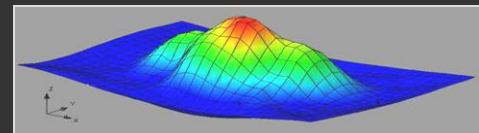


EPA Optimization: It's Not Just for P&T Anymore

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U.S. EPA Superfund Program

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US Army Corps of Engineers
17 June 2010

E2S2 Conference

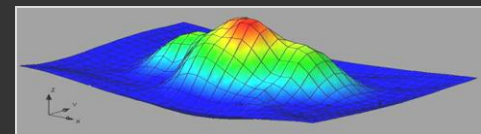


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Presentation Overview

- Brief background on Superfund optimization efforts
- Lessons learned from P&T optimization
- Expanding optimization beyond P&T
 - Independent Design Reviews (IDRs)
 - Responsible Party sites
 - Green remediation
- Developing a Superfund national strategy for optimization

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Why Optimization

- There may be many microscopes on EPA for each remedy, including:

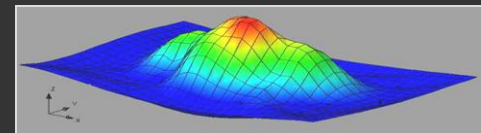
Local community
PRPs

State
Taxpayer/Congress

Press
NGOs

- Remediation is an inexact science
 - Continuously evolving understanding of the science
 - Continuously advancing technologies
 - Changing regulatory targets (arsenic, dioxin)
 - Limited data in even the best of scenarios
 - Opinions varying from professional to professional
- Challenging conditions for EPA staff
 - Keeping up with limited resources (funding and staff)
 - Keeping up with staff and management turnover
 - Aging infrastructure
 - Preparing properties for reuse
 - Managing and using massive amounts of site data

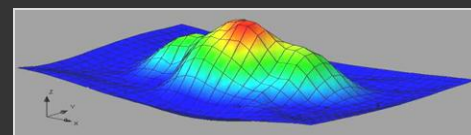
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Optimization at EPA

- Comprehensive and systematic review of a site's past, current, and planned clean-up activities by a team of independent technical experts to identify cost efficiencies and protectiveness improvements
 - Utilize 3-person optimization teams independent from the site
 - Support provided through OSRTI or regional contracts
 - Reviews typically completed within 6 months
- Early focus on Fund-lead P&T sites through Remediation System Evaluations (RSEs)
- Recently, optimization expanded to other points in pipeline

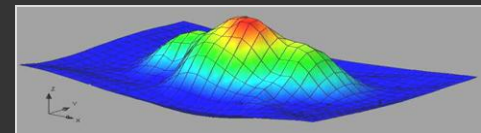
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Brief History

- 2000 – Piloted optimization at 20 Fund-lead P&T sites
- 2002 – Began applying LTMO for ground water sites
- 2004 -- Superfund adopted the “Action Plan for Remedy Optimization” for Fund-lead P&T sites
- 2007 – Began applying optimization earlier in the clean-up process (IDRs)
- Currently - green remediation, PRP-sites, and Five Year Review assistance all incorporated into optimization

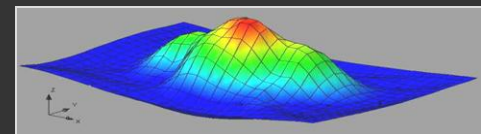
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Optimization Findings

- Benefits and results of optimization have been widely documented
 - Optimized nearly 100 sites (mainly P&T)
 - Identified >\$350M in potential cost savings/avoidance
 - Prepared 20+ documents and 10+ internet seminars to communicate lessons learned
 - Trained EPA staff in all 10 Regions
 - Trained thousands of contractors and other professionals
 - Developed tools and protocols to be used by RPMs

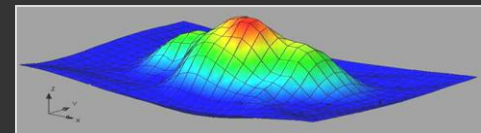
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A Sample of Sites Evaluated

- 12 wood treating sites
 - P&T systems
 - NAPL recovery, thermal remediation
 - Sediment capping
 - Biosparging
- 31 former industrial facilities, landfills, etc.
 - P&T systems
 - Soil capping
 - NAPL recovery, chemical oxidation
 - Air sparging / soil vapor extraction/ groundwater recirculation
 - Barrier walls
 - Constructed wetlands
- 2 mining sites (acid mine drainage and mine tailings)
 - Surface water collection and treatment, water diversion
 - P&T systems

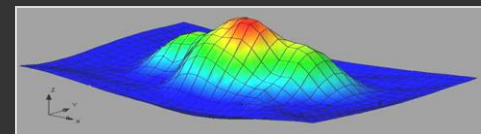
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Optimization Results

- Based on an analysis of 52 of the optimized sites...
 - 83% of sites had cost savings opportunities identified through optimization
 - 52% of sites had cost savings opportunities > \$1 million
 - At one site, cost savings opportunities were > \$11 million
- Based on the same set of 52 of the optimized sites...
 - 62% of sites benefitted from recommendations to help improve or confirm control of plume migration
 - 33% benefitted from recommendations to help eliminate or confirm no human exposures
 - 19% benefitted from recommendations to help eliminate or confirm no ecological exposures
 - Similarly positive findings for other studies

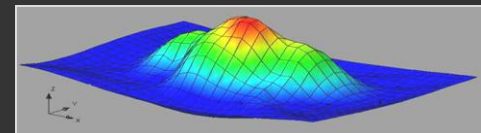
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Lessons Learned – Beyond Cost and Protectiveness

- Site team and management provided with a valued third-party perspective
 - Helps provide confidence in path forward
 - Helps provide a structured strategy for moving forward
 - Helps weigh pros and cons of various options
 - Helps build consensus among various stakeholders
 - Helps balance technical input from sole site contractor
- Helps cross-pollinate expertise among sites
- Can identify expedited path for site closure
- Can facilitate transfer of LTRA sites to States

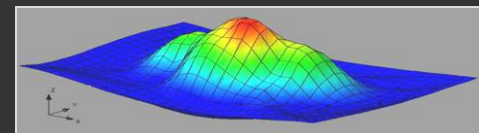
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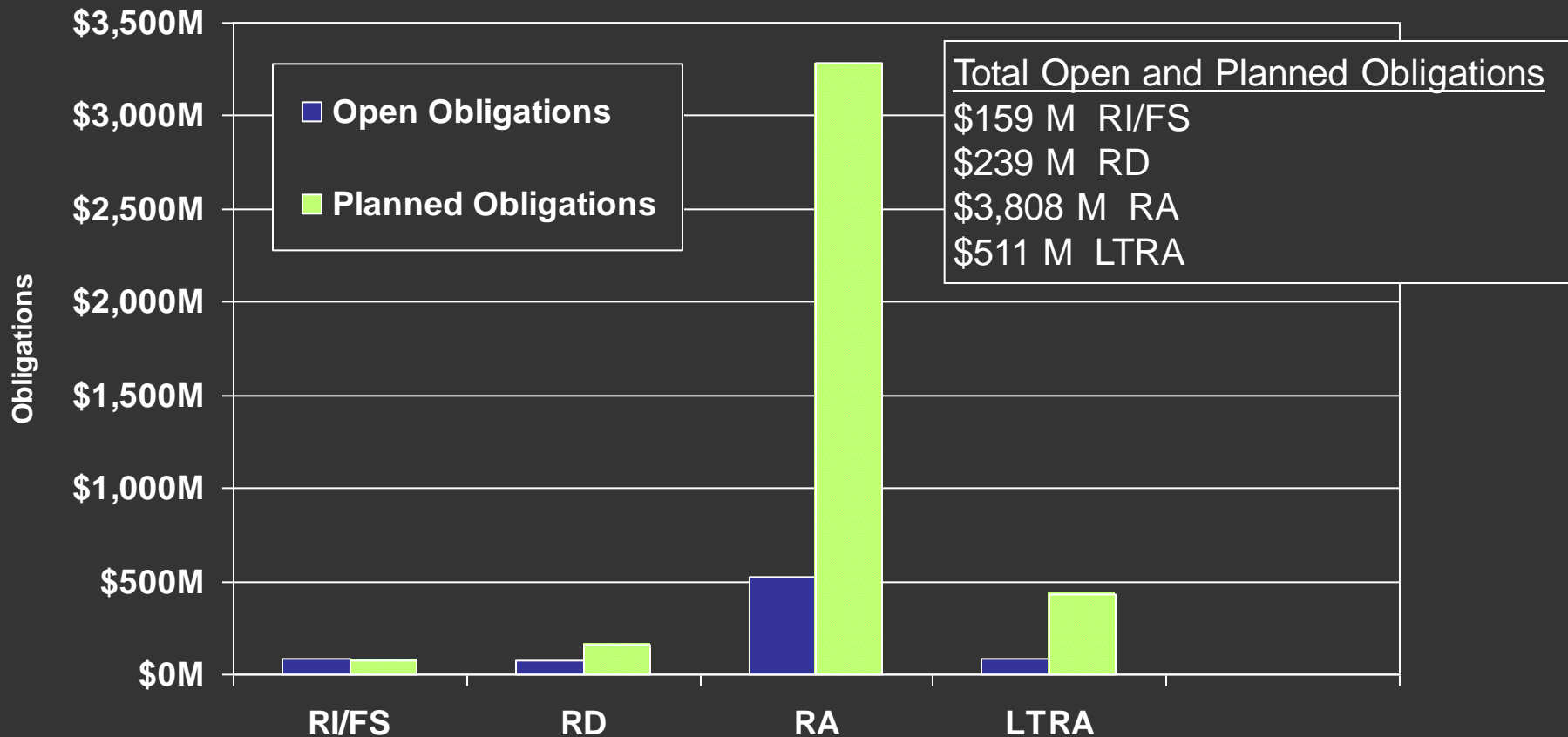
Lessons Learned (cont.)

- Conclusions regarding a potential path forward
 - Optimization might provide equal or improved benefit during the remedy selection and remedy design stages
 - Responsible Party sites could also benefit from EPA-led optimization

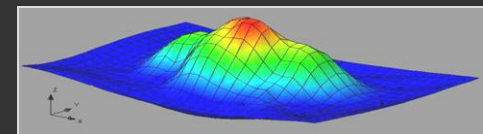
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Open and Planned Obligations For Our Fund-Lead Universe

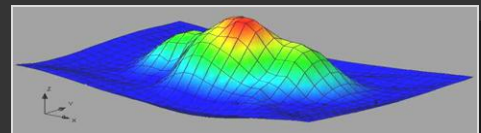


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Independent Design Reviews

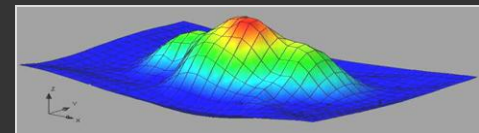
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Independent Design Reviews

- **Similar in scope to RSE**
 - Third-party review by team of experts
 - Consider life-cycle cost, effectiveness, and protectiveness
 - Document review, site visit, draft report, and final report
 - ~\$35K
- **Review conducted during**
 - Remedy selection
 - Remedy design
 - Remedy “re-design”
- **Review includes additional follow-up to**
 - Make process more dynamic
 - Keep communication lines open between review team and site team
 - Allow review team to comment on results of suggested items

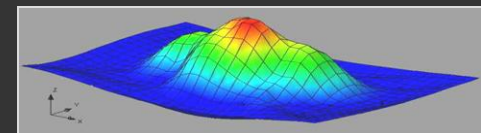
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IDR Pilot Summary

- Cost: Potential for substantial cost savings
 - Potential to substantially reduce RA costs by assisting with remedy selection and design (millions of dollars at one site))
 - Potential to reduce contractor costs by providing a check on scope and cost estimates (hundreds of thousands at 3 sites)
- Time: Potential to move sites more quickly through the program
 - Potential to move sites closer to O&F or start of LTRA clock in an accelerated time frame)
- Information: Potential to provide significantly more information for RPM decision making
 - More confidence when negotiating with PRPs
 - More confidence that risks to human health and the environment are being addressed
 - More confidence that the most cost effective path is chosen

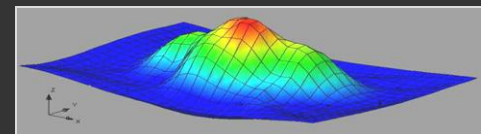
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IDR Pilot Summary

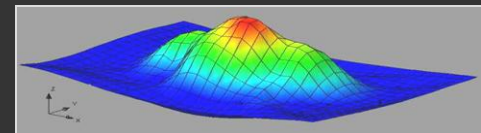
- Promising results so far at PRP and Fund-lead sites at various stages of the clean-up process
- Optimization plays an important role with technical assistance that is often not available to RPMs
- Recommendation to offer IDR support to more sites/RPMs

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Green Remediation and Optimization

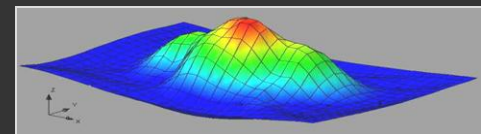
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Green Remediation

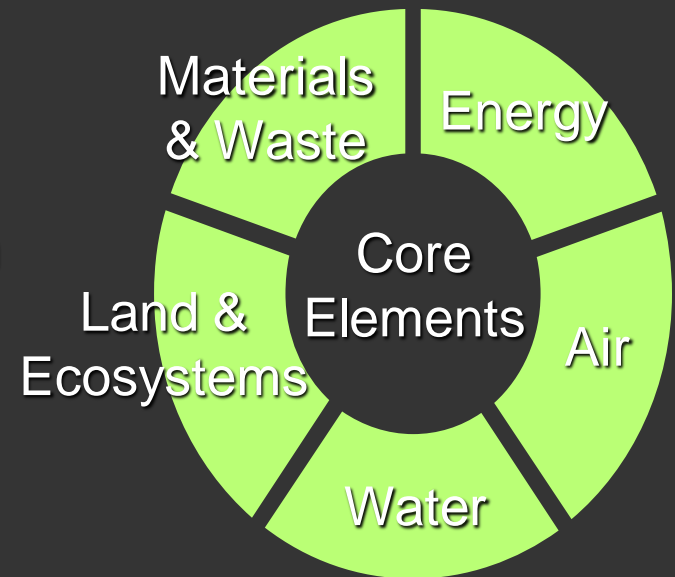
- Green remediation is linked with optimization for several reasons
 - Evaluating the environmental footprints of a remedy provides another perspective during remedy review...
 - The input for green remediation evaluation is often collected during optimization reviews... doing them together avoids duplication of effort
 - Green remediation is synonymous with efficiency, which is a core component of optimization

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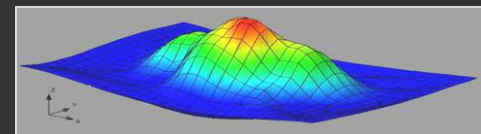


Green Remediation

- Technical documents
www.cluin.org/greenremediation)
 - Best management practices by technology
 - P&T
 - Site investigation
 - Excavation/surface restoration
- EPA methodology for conducting environmental footprint analyses
 - Energy and atmosphere (in progress)
 - Water (in progress)
 - Materials use and waste generation (in progress)



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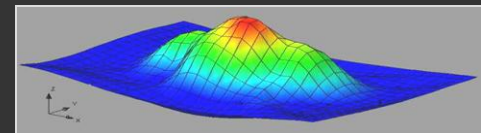


Green Remediation

- Green remediation evaluations
 - Detailed footprinting analyses conducted for lessons learned independent of optimization efforts
 - Romic (in process)
 - BP Wood River (in process)
 - Travis AFB (planned)
 - As a component of optimization
 - Mill Creek Dump Superfund Site
 - Alaric, Inc. Superfund Site
 - 10th Street Superfund Site
 - Shepley's Landfill (Army)

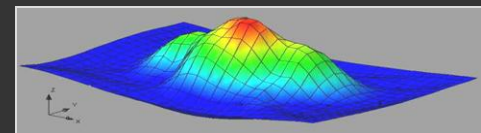


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Expanding Optimization to More Superfund Sites

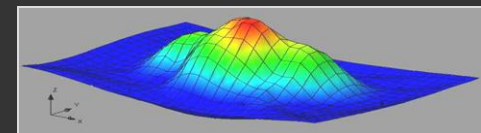
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Expanding Optimization

- Excellent results for optimization conducted to date, but...
 - Only approximately 10% of the 1500 Superfund NPL sites have been evaluated; therefore, only a small fraction of potential time, monetary and energy savings, and added public health protection have been realized.
 - Need to determine how EPA will identify resources for optimization
 - Need to do a better job of involving management in optimization

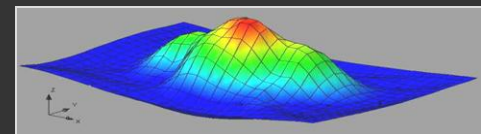
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Expanding Optimization

- Considering implementing a multi-year optimization strategy that...
 - Uses the optimization tools, lessons learned, and expertise of Superfund Program and optimization contractors
 - Bridges Triad and optimization technical support
 - Blends Regional and HQs resources
 - Involves Regional and HQ management
 - Has clear comprehensive, nationwide objectives
 - Tracks results
 - Looks a lot like AFCEE's ERP-O Program

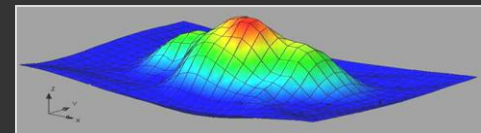
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Schedule

- Approval to move forward
- Working on briefings for OSWER and EPA Regional offices
- Planning a collaborative effort to develop strategy
- National strategy to be developed and fully implemented by 2012
- Core elements of the national strategy
 - Planning
 - Communication and training
 - Implementation
 - Measurement

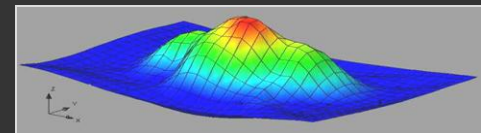
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Take Home Messages

- It makes sense to get a 2nd opinion for complex remedial activities at Superfund sites
- RPMs cannot be expected to be experts in policy, engineering, chemistry, geochemistry, statistics, cost-engineering, etc.
- Don't rely only on the site contractor
- Optimization studies - remember to
 - Keep evaluations independent
 - Use qualified optimization review teams
 - Don't consider it a one-time event
- Potential for expanding EPA optimization through a national strategy

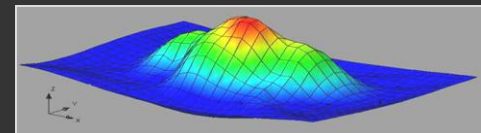
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EPA Optimization Documents

- ☀ *Elements for Effective Management of Operating Pump and Treat Systems, 2002*
- *Cost-Effective Design of Pump & Treat Systems, 2005*
- *Effective Contracting Approaches for Operating Pump and Treat Systems, 2005*
- *O&M Report Template for Ground Water Remedies (with Emphasis on Pump and Treat Systems), 2005*
- ☀ *Roadmap to Long-Term Monitoring Optimization, 2005*
- *Optimization Strategies for Long-Term Ground Water Remedies (with Particular Emphasis on Pump and Treat Systems), 2006*
- *Options for Discharging Treated Water from Pump & Treat Systems, 2007*
- ☀ *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, 2008*

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